# Baton Rouge Post 1999 Rate of Progress

**Background** - Section 182(c)(2)(B) of the 1990 Amendments to the Clean Air Act (CAA) requires that the state implementation plan (SIP) contain a demonstration of reasonable further progress for milestone years and the attainment year. The CAA specifically states the following: "Reasonable further progress demonstration (hereinafter, ROP) – A demonstration that the plan, as revised, will result in VOC emissions reductions from the baseline emissions described in subsection (b)(1)(B) equal to the following amount averaged over each consecutive 3-year beginning 6 years after the date of the enactment of the Clean Air Act Amendments of 1990, until the attainment date: (i) at least 3 percent of baseline emissions each year; or…"

The State has previously submitted reasonable further progress plans for the milestone years 1996 and 1999. The following describes the plans for achieving Post 1999 ROP.

**Section 1: Calculation of Post-1996 Target Levels and Required Reductions**
In order to determine if the current strategies are sufficient to achieve the required Rate-of-Progress (ROP) reductions of at least 3 percent per year from 1999 to 2005, the Louisiana Department of Environmental Quality (LDEQ) calculated the target level of emissions and the required reductions for the 2002 milestone year and the 2005 attainment year. Since guidance allows the use of reductions of volatile organic compounds (VOC), or oxides of nitrogen (NOx) or a combination thereof to satisfy ROP, a 2 percent per year NOx reduction and a 1 percent per year VOC reduction combination was chosen. This means that the total required NOx reduction from 1999 to 2005 will be 12 percent and the total required VOC reduction will be 6 percent. This section explains the procedures that were used to calculate the target levels of emissions and the required reductions for the years 2002 and 2005.

**Section 2: Calculation of the 2002 and 2005 Target Levels of Emissions and Required Reductions**

The target level represents the maximum amount of emissions that a nonattainment area can emit for a target year while complying with the ROP plan. - There are six steps in calculating a target level. After the target level is calculated, the final step is to calculate the required reductions, which includes a reduction amount to offset growth for the target period. The following steps explain the procedures that were used to calculate the target levels and required reductions.

**Step 1: Develop the 1990 Base Year Inventory**

**(Refer to Appendix A -Target Level Calculations: Figure 1 – 2002 NOx, Figure 2 – 2005 NOx, Figure 3 – 2002 VOC, Figure 4 – 2005 VOC)** Emission estimates for NOx and VOC for the four major source categories for 1990 were taken from the previous ROP submittal titled "Post 1996 Rate of Progress Plan and Attainment Demonstration" dated January 2, 1997. These estimates were adjusted as follows: the Area /with Nonroad source category was re-calculated using the EPA Draft NONROAD 2002a Model **(Appendix B)** and the Mobile source category was re-calculated using the MOBILE6 Model **(Appendix**

**C)**. The VOC Point source category was adjusted to include the emissions from Trunkline Gas in St. Mary Parish. The Biogenics category was not adjusted. Adjusted NOx and VOC emissions by source category for 1990 for the Baton Rouge nonattainment aea are shown in Table 2-1.

**Table 1: 1990 Base Year Emissions**

| | NOx (tons/day) | | VOC (tons/day | |
|---|---|---|---|---|
| Source Category | 1997 SIP | 2004 SIP | 1997 SIP | 2004 SIP |
| Stationary Point | 184.0 | 184.0 | 115.0 | 128.4 |
| Area /with Nonroad | 36.8 | 26.8 | 47.2 | 40.7 |
| Mobile | 69.2 | 60.5 | 53.4 | 78.2 |
| Biogenic | 0.0 | 0.0 | 99.6 | 99.6 |
| **Total** | **290.0** | **271.4** | **315.2** | **347.0** |

### Step 2: Calculate the 1990 ROP Base Year Inventory

The 1990 ROP Base Year Inventory is calculated by subtracting the Biogenic source category from the 1990 Base Year Inventory. Since the Biogenic source category for NOx in 1990 is zero, the 1990 ROP Base Year Inventory for both 2002 and 2005 is the same as the 1990 Base Year Inventory. The Biogenic source category for VOC is 99.6 tons per day (TPD). So, the 1990 ROP Base Year Inventory for both 2002 and 2005 is 247.4 TPD.

### Step 3: Calculate the 1990 Adjusted Base Year Inventory

The Clean Air Act (CAA) specifies the emission baseline from which each ROP emission reduction milestone is calculated. Section 182(c)(2)(B) states that the reductions must be achieved "from the baseline emissions described in subsection (b)(1)(B)." This baseline value is termed the 1990 Adjusted Base Year Inventory. Section 182(b)(1)(B) defines baseline emissions (for purposes of calculating each milestone emission reduction) as the "total amount of actual emissions from all anthropogenic sources in the area during the calendar year of enactment." This section excludes from the baseline the emissions that would be eliminated by Federal Motor Vehicle Control Program (FMVCP) regulations promulgated by January 1, 1990, and Reid Vapor Pressure (RVP) regulations promulgated by the time of enactment (June 11, 1990) that require maximum RVP limits for gasoline to be sold in nonattainment areas during the ozone season.

The FMVCP/RVP reduction between 1990 and the target year is obtained by subtracting the mobile emission inventory based on the projected target year fleet emission factors and 1990 Vehicle Miles Traveled (VMT) from the 1990 mobile emission inventory. MOBILE6 was used to estimate the emission factors and the Louisiana Department of Transportation and Development provided VMT information. (Appendix H)

**(See Appendix C)** For NOx 2002, the mobile emission inventory using 2002 emission factors is 38.9 TPD and the 1990 mobile emission inventory is 60.5 TPD. The difference of 21.6 is the FMVCP/RVP adjustment used in Figure 1. The 1990 Adjusted Base Year Inventory Relative to 2002 is 249.8 TPD. For NOx 2005, the mobile emission inventory

using 2005 emission factors is 35.6 TPD and the 1990 mobile emission inventory is 60.5 TPD. The difference of 24.9 is the FMVCP/RVP adjustment used in Figure 2. The 1990 Adjusted Base Year Inventory Relative to 2005 is 246.5 TPD.

**(See Appendix C)** For VOC 2002, the mobile emission inventory using 2002 emission factors is 30.5 TPD and the 1990 mobile emission inventory is 78.2 TPD. The difference of 47.8 is the FMVCP/RVP adjustment used in Figure 3. The 1990 Adjusted Base Year Inventory Relative to 2002 is 199.6 TPD. For VOC 2005, the mobile emission inventory using 2005 emission factors is 27.0 TPD and the 1990 mobile emission inventory is 78.2 TPD. The difference of 51.3 is the FMVCP/RVP adjustment used in Figure 4. The 1990 Adjusted Base Year Inventory Relative to 2005 is 196.1 TPD.

### Step 4: Calculate the Required 3-year ROP Reductions for 2002 and 2005

The NOx ROP reduction for the three-year period from 1999 to 2002 was calculated by multiplying the 1990 Adjusted Base Year Relative to 2002 by 6 percent (2 percent per year). The reduction is equal to 15.0 TPD. The NOx ROP reduction for the three-year period from 2002 to 2005 was calculated by multiplying the 1990 Adjusted Base Year Relative to 2005 by 6 percent. The reduction is equal to 14.8 TPD.

The VOC ROP reduction for the three-year period from 1999 to 2002 was calculated by multiplying the 1990 Adjusted Base Year Relative to 2002 by 3 percent (1 percent per year). The reduction is equal to 6.0 TPD. The VOC ROP reduction for the three-year period from 2002 to 2005 was calculated by multiplying the 1990 Adjusted Base Year Relative to 2005 by 3 percent. The reduction is equal to 5.9 TPD.

### Step 5: Calculate the Correction Factors for Fleet Turnover

The CAA does not allow states to take credit in ROP plans for fleet turnover - the gradual replacement of older, pre-control vehicles with newer vehicles with controls. The determination of the fleet turnover correction factor, FTx, is discussed below.

The fleet turnover correction factor (FTx) for 2002 is equal to the difference between the FMVCP/RVP Mobile reductions for 2002 and the FMVCP/RVP Mobile reductions for 1999. The FTx for 2005 is equal to the difference between the FMVCP/RVP Mobile reductions for 2005 and the FMVCP/RVP Mobile reductions for 2002.

**(See Appendix C)** The FTx for NOx 2002 is 21.6 TPD less 17.4 TPD or 4.2 TPD. The FTx for NOx 2005 is 24.9 TPD less 21.6 TPD or 3.3 TPD. The FTx for VOC 2002 is 47.8 TPD less 42.9 TPD or 4.9 TPD. The FTx for VOC 2005 is 51.3 TPD less 47.8 TPD or 3.5 TPD.

### Step 6: Calculate the Target Levels for 2002 and 2005

For the purpose of calculating the 2002 and 2005 target levels, first the 1999 target levels had to be determined.

For NOx 1999, since LDEQ has never before based an ROP plan on NOx, the 1999 target level had not previously been developed. Following ROP guidance, the 1999 Target Level is simply the 1990 Base Year Inventory of 271.4 TPD less the FMVCP/RVP reductions of 17.4 TPD **(Appendix C)**. Thus, the 1999 NOx Target Level is equal to 254.0 TPD.

For VOC, the 1999 target level of 143.6 TPD **(Appendix A – Figure 5)** that had previously been reported in the document titled "Post 1996 Rate of Progress Plan and Attainment Demonstration" dated January 2, 1997, had to be adjusted for Trunkline Gas, MOBILE6 and the NONROAD 2002a models in order to put all ROP calculations on the same basis. This was done **(Appendix A – Figure 6)** by subtracting from the revised 1990 Base Year Inventory without biogenics, (247.4), the FMVCP/RVP reductions (42.9) and the 24 percent (15 percent for 1990-96 and 9 percent for 1997-99) ROP reductions (49.1) for the 1990 to 1999 period. Thus, the revised 1999 VOC Target Level is equal to 155.4 TPD.

To determine the 2002 NOx Target Level **(Appendix A – Figure 1)**, 15.0 TPD for the Required 3-year ROP Reductions from 1999 to 2002 and 4.2 TPD for the 1999-2002 Fleet Turnover Correction were subtracted from the 1999 Target Level of 254.0 to get the 2002 Target Level of 234.8 TPD. To determine the 2005 NOx Target Level **(Appendix A – Figure 2)**, 14.8 TPD for the Required 3-year ROP Reductions from 2002 to 2005 and 3.3 TPD for the 2002-2005 Fleet Turnover Correction were subtracted from the 2002 Target Level of 234.8 to get the 2005 NOx Target Level of 216.7 TPD.

To determine the 2002 VOC Target Level **(Appendix A – Figure 3)**, 6.0 TPD for the Required 3-year ROP Reductions from 1999 to 2002 and 4.9 TPD for the 1999-2002 Fleet Turnover Correction were subtracted from the 1999 Target Level of 155.4 to get the 2002 Target Level of 144.5 TPD. To determine the 2005 VOC Target Level **(Appendix A – Figure 4)**, 5.9 TPD for the Required 3-year ROP Reductions from 2002 to 2005, 3.5 TPD for the 2002-2005 Fleet Turnover Correction and 6.1 TPD for triggered contingency reductions were subtracted from the 2002 Target Level of 144.5 to get the 2005 VOC Target Level of 129.0 TPD.

### Final Step: Calculate the Required Reductions for 2002 and 2005

Per ROP guidance, the required reductions for a target year are equal to the sum of the ROP reductions and the fleet turnover correction factor, plus enough additional reductions to offset projected growth for the period.

In order to determine projected Industrial Point and Area /with Nonroad growth for the periods 1999 to 2002 and 2002 to 2005, the Emission Growth Analysis System 4.0 (EGAS) was used. Beginning with the 1990 Base Year Inventory, the projected growth of NOx and VOC Industrial **(Appendices D.1 and D.2)** and Area /with Nonroad **(Appendices E.1 and E.2)** sources to 1999, 2002 and 2005 was determined. Next, the on-road NOx and VOC Mobile source growth **(Appendices F.1 and F.2)** for 1999, 2002, and 2005, was determined based on VMT projections from the Louisiana Department of Transportation and Development. This was the same methodology used for growth in the earlier ROP plans except for the use if the later version of EGAS. Table 2-2 provides a summary of the growth determinations.

**Table 2-2: Industrial, Area /with Nonroad, and Mobile Source Growth**

| Category (TPD) | 1990 | 1999 | 2002 | 2005 | Growth 99-02 | Growth 02-05 |
|---|---|---|---|---|---|---|
| **NOx** | | | | | | |
| Stationary Point | 184.0 | 181.8 | 194.2 | 200.9 | 12.4 | 6.7 |
| Area /with Nonroad | 26.8 | 27.1 | 27.6 | 27.9 | 0.5 | 0.3 |
| Mobile | 60.5 | 48.4 | 45.3 | 30.9 | -3.1 | -14.4 |
| **VOC** | | | | | | |
| Stationary Point | 128.4 | 129.6 | 137.4 | 141.7 | 7.9 | 4.3 |
| Area /with Nonroad | 40.7 | 41.2 | 42.2 | 43.5 | 1.0 | 1.3 |
| Mobile | 78.2 | 30.7 | 26.5 | 18.8 | -4.1 | -7.7 |

For NOx for the 1999 to 2002 period **(Appendix A – Figure 1)**, the required reductions are equal to the 6 percent ROP of 15.0 TPD plus the 1999-2002 Fleet Turnover Correction Factor of 4.2 TPD and the growth offset of 9.8 TPD. The 1999 to 2002 Required Reductions are 29.0 TPD. For the 2002 to 2005 period **(Appendix A – Figure 2)**, the required reductions are equal to the 6 percent ROP of 14.8 TPD plus the 2002-2005 Fleet Turnover Correction Factor of 3.3 TPD and the growth offset of negative 6.8 TPD. The 2002 to 2005 Required Reductions are 11.3 TPD.

For VOC for the 1999 to 2002 period **(Appendix A – Figure 3)**, the required reductions are equal to the 3 percent ROP of 6.0 TPD plus the 1999-2002 Fleet Turnover Correction Factor of 4.9 TPD and the growth offset of 4.8 TPD. The 1999 to 2002 Required Reductions are 15.7 TPD. For the 2002 to 2005 period **(Appendix A – Figure 4)**, the required reductions are equal to the 3 percent ROP of 5.9 TPD plus the 2002-2005 Fleet Turnover Correction Factor of 3.5 TPD and the growth offset of negative 2.2 TPD. The 2002 to 2005 Required Reductions are 7.2 TPD.

**Section 3: Emission Reductions to Comply with ROP**

In Section 2 the target levels for 2002 and 2005 were determined. The target level represents the maximum amount of emissions that a nonattainment area can emit for a target year while complying with the ROP plan. The following table shows the target levels for NOx and VOC from Section 2.

**Table 3-1: Target Levels**

| Target Levels, TPD | NOx | VOC |
|---|---|---|
| 2002 | 234.8 | 144.5 |
| **2005** | **216.7** | **129.0** |

The following table compares the 2005 target levels for NOx and VOC to the emission projections from the urban airshed modeling for 2005 **(Attachment G)**. The emission projections are on a typical weekday basis during the ozone season except for the Area with/Nonroad category. The emissions from this category were estimated using the EPA Draft NONROAD 2002a Model in order to be on the same basis as the 1990 Base Year Inventory.